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ABSTRACT

This autoinstructional program deals with the study of a common environmental factor-disposition of useless materials. It is a learning activity for low achievers in high school biology classes, requiring only 15 minutes of study time. Three behavioral objectives are listed, and seven references are cited in the bibliography. The student script includes a worksheet that can be completed during or following the use of the script. (EB)

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TRASH

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TEACHER'S GUIDE

PACKET NUMBER	628.445 H
SUBJECT	Biology
TITLE	Trash
LEVEL	Low - High School
GRADE	10
BEHAVIORAL OBJECTIVES	To list common sources of trash To list common trash disposal methods To list some recycling alternative for trash
TIME	15 minutes
EQUIPMENT	Tape Recorder Cassette Tape EQ Index Slide Viewer Slides
BIBLIOGRAPHY	Dickson, Edward M., "Taking It Apart", Environment, July/August 1972, pp. 36-41 Grinstead, Robert R., "The New Resource", Environment, Dec. 1970 pp 2-17 Hannon, Bruce M., "Bottles Cans Energy", Environment, March 1972 pp 11-21 Andrews, William A.; Moore, Donna K., and LeRoy, Alex C., A Guide To The Study of Environmental Pollution, Prentice Hall, Inc., Englewood Cliffs, N. J. 1972 Knight, Vick Jr.; Moore, John E. It's Our Future, Charter School Books, Inc., N. Y. 1972 Knight, Vick Jr.; Moore, John E. It's Our World, Charter School Books, Inc. N.Y. 1972 DuPont pamphlet, Context

SCRIPT

TRASH

Where do you throw things when you're done with them - in the trash: - and where does it go from there? - Oh, I guess the garbage man takes it and throws it away. Did you ever wonder where this place called "away" is that everything goes to? I've been wondering about that a lot lately. Many of the things we throw away will stay there because they are relatively indestructible. Now that our mountains of trash are becoming greater and greater it is time that something is done about the garbage situation.

The average person produces 5 pounds of trash a day. This does not include the garbage produced by industry or the old discarded cars after we're done with them. In the AT we're going to take a pictorial journey through some of America's trash piles to see if there might be something we can do about all this junk.

Look at SLIDE #1 (National Geographic p. 750, Dec. 1970.)

This is trash! Paper, cans, toys, jars and everything imaginable becomes trash. But much of our trash is usable. I'm not speaking of usable in the sense that we might give old clothes to the Salvation Army and thereby make them of use again but I mean that most things can be broken down and remade into something completely new.

You could say that Americans are the trashiest people in the world. Although we are only 5% of the world's population, we use over 50% of the natural resources consumed each year. Most of this ends up as trash at some time or other. If we put our minds to it we could devise factories which not only could dispose of trash by decomposing it into usable substances, but could actually make a profit on it. One such experimental plant is planned for the Wilmington area if federal funds to support it aren't cut back.

Look at SLIDE #2 (National Geographic p. 772).

This is also trash. It is raw untreated human sewage pouring from the town of Watervliet, N. Y. into the Hudson River. Once we've flushed the toilet we tend to forget about the waste we've produced. After all it's gone to that great place called "away". But it actually hasn't gone anywhere unless we live in a town with adequate sewage treatment. It may be partially treated or not treated at all and then dumped into the rivers and streams to mingle in the water where we swim or to enter the water supply we or someone else drinks. It wasn't too bad when settlements had few people and the bacteria of the stream could help with the cleansing process but our rivers can't handle today's wastes. Every year there are articles about areas which have contaminated shellfish. Disease causing viruses such as hepatites may be picked up by shellfish if they live in waters where there is untreated

human sewage. Innocent people eating these shellfish then contract these diseases. With adequate sewage treatment this method of spreading diseases could be eliminated.

Look at SLIDE #3. We are a nation of cars. How many cars does your family own? One? Two? Maybe even 3? Cars are nice to have - they get us where we're going. Some people even use them as status symbols, but they are also one of man's worst enemies. They are the number one cause of air pollution in the United States; they form trash heaps of enormous size - for how do you easily dispose of a car; and they use a large amount of valuable natural resources. For example, the average sized car is made of 2,500 lbs. of steel, 30 lbs. of copper, 50 lbs. of cast iron, 50 lbs. of zinc, 50 lbs. of lead, plus aluminum and other minerals. Now consider how much gas and oil a car uses. This is timely now in 1973 with threats of price jumps and gas rationing. Another form of trash associated with autos is the large amount of tires needed. It is estimated that over 100 million tires are thrown away each year. Much of our trash could be put to new uses. Instead of burning tires and adding to air pollution or rolling them into lakes and rivers, they can be ground up and used to make blacktop asphalt.

How do we get rid of our home trash once we've produced it?

Sometimes we just dump it on the side of the road. Just think how many times you've seen someone throw a McDonald's bag or a

cigarette pack out the window, drop a candy or gum wrapper on the ground or sink a beer can in a steam?

You can drive along many of the country roads around here and see whole bags of trash thrown from a car. If a family disposes of all its trash for a year in this manner you can imagine how many miles of highways it can clutter in a year. Some of the garbage will decompose, but the plastic and cans will remain as an eyesore.

Look at SLIDE #4. Sometimes trash is dumped in areas called landfills. Usually this is in a low area like a valley or large ditch. The trash is dumped and then covered with dirt. The biodegradable material breaks down but some acts as a suitable area for disease germs to multiply and possibly enter water supplies. Naturally some of the trash never breaks down. The materials in it could be used again if they were effectively recycled.

Now look at SLIDE #5. (p. 21 middle picture, Pollution)
A common means of garbage disposal is incineration. Just looking at this picture should show you some of the disadvantages to this method. First of all it adds to air pollution and secondly some materials do not burn. There is also the problem of wasting materials that could be used again.

A new means of burning trash is currently coming into use called pyrolysis. In pyrolysis, the waste is heated to about $500^{o}C$ with little or no air present. Everything is reduced to a mass of charcoal,

minerals, gases and liquids. Much of this is used as fuel to run the system. The extra can be sold to help reduce the cost involved. There are some pyrolysis systems being developed which separate out usable substances such as bottles and iron metals. This method is a great improvement over incineration as it eliminates much of the air pollution caused by incineration, it compacts the trash to about 90% of its original volume and it provides the fuel to keep itself running. One of the biggest problems involved in getting cities and towns to adopt this method is that it costs millions of dollars to make the original change over.

As mentioned earlier a new plant is being planned for Delaware. This is being designed by Hercules to handle 500 ton of domestic waste and 230 tons of sewage sludge per day in New Castle County. Once it is functioning it is hoped that the plant will not only pay for itself, but will operate at a profit. It is hoped that most of the materials will be able to be recycled into a salable raw material. The building of the plant is dependent upon government funds. If these are cut back, it will not be built.

Let's now take a look at some of the uses for garbage. Look at SLIDE #6. It may take a little time and effort, but recycling <u>is</u> worthwhile. This picture shows an elementary school which is collecting aluminum trash to be recycled. There are recycling drives in the Newark area for aluminum cans, glass bottles, and paper but many more people could participate than do.

Presently 90% of the junked autos are recycled to some extent. The remaining is a large number to be left littering the streets, yards and land around us. Their materials could be used to make more cars.

Old glass is used to make new bottles and glassware, but it can also be put to uses you might not suspect. Look at SLIDE #7. This man is smoothing out a new road in Fullerton, California made of a substance called glasphalt. In it are the fragments from one million bottles collected in the town. Old tires are also now being ground up into paving material. Another use for ground glass is to make sand to replace that which is washed away each year. The rough edges of the glass would first be polished to make it harmless to bare feet.

Americans like convenience. The throwaway bottle and can has quickly replaced the returnable. In 1958, 98% of all sodas and 58% of all beer was in returnable bottles. Now, fifteen years later only 32% of sodas and 30% of the beer is in returnable bottles. Not only do the throw-away bottles add to the trash situation, but they also involve use of a large amount of raw materials and energy. If people would begin using returnable bottles again all three of these problems would be helped.

As you can see there <u>is</u> a lot that the average person can do to help with the trash situation. Are <u>you</u> doing anything to help? What will happen to your 5 pounds of trash today?

Rewind the tape. Read the EQ Index on page 13 and answer the questions.

WORKSHEET

TRASH

A. List 5 examples of how trash can be recycled into usable material.

1.

2.

3.

4.

5.

B. More people are participating in recycling. List two examples that support that statement.

1.

2.

C. How much glass could be reclaimed from 500 tons of garbage?

D. What percentage of the paper in the U. S. gets recycled?

E. How much recycled scrap is in U. S. steel?